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THE HORN SPEAKER

Operating the Neutrodyne Receiver

Directions for Tuning, How Best to Use Different Kinds of Tubes, and How to "Shoot Trouble"

By KIMBALL HOUTON STARK
Chief Engineer, F. A. D. Andrea, Inc.

The necessity of such a neutralizing adjustment is characteristic only of neutrodyne receivers. Due to the radical difference of the circuit, the method of tuning is also quite different from the tuning of the usual regenerative or non-regenerative receiver. Consequently, instructions must be very explicit.

In this article, we shall accordingly study in detail the method of tuning neutrodyne circuit receivers and in addition, some general information will be given on antennas, vacuum tubes and "trouble-shooting."

TUNING THE RECEIVER

THE procedure of tuning your neutrodyne receiver, providing antenna, ground, and all battery connections have been properly made, is as follows:

1. Insert the recommended vacuum tubes (See paragraph on the use of different tubes) in their respective sockets and with the power rheostat at its correct position for the type of tubes you are using, and with the vernier rheostat knob turned to the left as far as possible, and with the plug of the loud speaker inserted in the "horn" jack, pull out the knob of the filament switch on the panel front, causing the three amplifier tube filaments to light.

2. Turn the vernier rheostat knob to the right slowly. When the filament current is turned on, the first indication that the receiver is functioning properly will be indicated by a slight noise in the phones. As the rheostat knob is turned farther to the right, this slight sensitivity indication does not increase in volume until a point near the end of the rheostat adjustment is reached. At this point will begin a comparatively loud "hissing" and "frying" noise. For the best signal reception the rheostat should be turned back slightly to a point just before this "hissing" and "frying" starts.

3. With the detector tube at approximately its right operating point, set "Neutroformer" dials 2 and 3 at the same dial setting. Select any particular dial setting, but take for instance the wavelength of station WEAF, 492 meters. Dial settings for this particular station are about 66 or 67. Setting dials 2 and 3 at this point, rotate dial 1 very slowly over its entire range from 0 to 100. If any broadcasting station is operating at the particular time at 492 meters, it should be heard at a maximum when the setting of dial 1 is approximately in the range of 10 or 15 above or below these settings of dials 2 and 3.

4. When signals from any particular broadcasting station are coming in, it is advisable to readjust dials, 1, 2, and 3 slightly and possibly also the vernier rheostat, in order to increase the intensity of the signals.

In tuning, the dials should be moved slowly. It may be found that the tuning adjustment will have to be changed slightly when shifting the phone plug or loud speaker plug from one jack to another.

Dials 2 and 3 should be rotated slowly at the same time, and about in step with each other. Then with dials 2 and 3 on the setting for a particular station, dial 1 is rotated until signals come in with maximum strength and clarity. Sharpness of tuning of neutrodyne receivers when using short indoor antennas is much greater than when using outdoor antennas.

In tuning neutrodyne receivers, the broadcasting stations will not be picked up by hearing "beat notes" and the usual regenerative whistling. As the dials are rotated the programs of different stations will be heard, first softly then with greater intensity and clarity as all adjustments are properly made for that particular station.

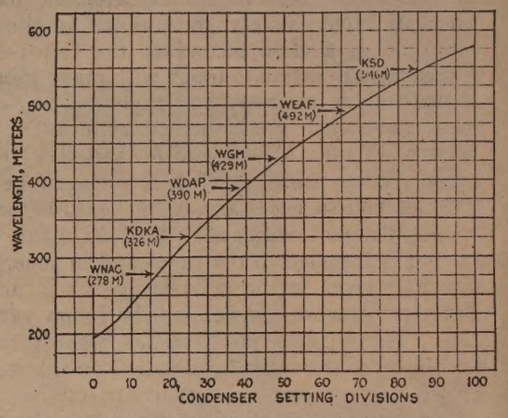


FIG. 1

Wavelength calibration curve showing approximately at what settings of dials 2 and 3 the various stations may be expected

THE WAVELENGTH RANGE

THE Neutroformer coils specified in these articles are designed to cover a wavelength range of from approximately 200 to 600 meters. The wavelength calibration curve is shown in Fig. 1 and has several broadcasting stations' wavelength calibration points indicated.

USING DIFFERENT TUBES WITH THE NEUTRODYNE

IN THE early stages of neutrodyne receiver development, receivers were constructed that allowed the neutralization of a given tube and circuit capacity and which did not operate efficiently when different vacuum tubes having different capacities were used. With the placing on the market of the UV-201-A and the dry-cell tube, this matter of basic design was very carefully studied, and now they, and other tubes, can be used with comparatively good success. It has been found that C-301-A tubes are the best for the radio- and audio-frequency amplifier circuits. The C-300 or

OPERATING DATA FOR VACUUM TUBES

TYPE OF TUBE	FILAMENT VOLTAGE	FILAMENT CURRENT (AMPERES)	"A" BATTERY SOURCE	PLATE VOLTAGE	USED AS			
					DETECTOR	R. F. AMPLIFIER	A.F. AMPLIFIER 1ST. STAGE	A.F. AMPLIFIER 2ND. STAGE
WD-12	1.1	0.20	1 DRY CELL	22½ TO 90	A	X	C	D
UV-199	3.0	0.06	3 DRY CELLS	22½ TO 90	D	A	C	D
UV-201-A C-301-A	5.0	0.25	6 VOLT STORAGE BATTERY OR 4 DRY CELLS	45 TO 120	C	A	A	A
UV-201 C-301	5.0	1.00	6 VOLT STORAGE BATTERY	45 TO 120	D	A	B	B
UV-200 C-300	5.0	1.00	6 " " "	18 TO 22½	A	Y	Z	Z
VT-1	4.0	1.10	6 " " "	22½ TO 67½	A	Y	B	B
VT-2	6.0	1.35	6 " " "	90 TO 350	D	B	B	A
216-A	6.0	1.35	6 " " "	67½ TO 120	D	B	B	A
UV-202	8.0	2.35	10 " " "	90 TO 500	X	D	B	A

LEGEND
A = EXCELLENT B = VERY GOOD C = GOOD D = FAIR X = POOR Y = VERY POOR Z = UNSUITABLE

FIG. 2

UV-200 is the best to use as detector tube. The UV-201-A is very good as an amplifier tube and is a close second to the C-301-A. I have been in intimate touch with many users of neutrodyne receivers and a great many of them have had good success with WD-11, WD-12, VT-1, VT-2, 216-A, and UV-199 tubes. When using any of these various types, it is, of course necessary to make sure that correct filament voltages as well as filament current is supplied to the tubes and in general the chart given in Fig. 2 covering "Operating Data for Vacuum Tubes" will be found variable. The lettered notations as regards the suitability of the tubes has been described with neutrodyne receivers particularly in mind.

The volume obtained using UV-199's or other dry-cell tubes is generally less than the volume obtained using UV-201-A or C-301-A

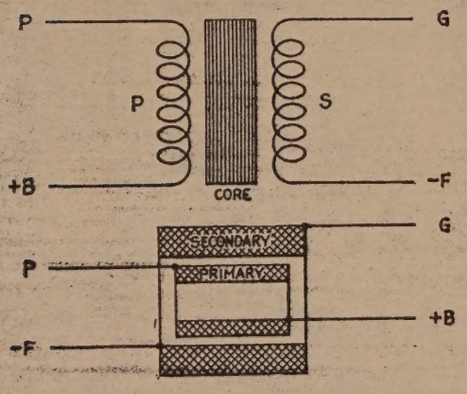


FIG. 3
Showing the audio-frequency transformer connections

tubes, and this in general is true when the other different types of dry-cell tubes are used. The volume obtained, however, with dry-cell tubes under correct conditions permits loud speaker operation on distant stations. It is suggested, however, that with UV-199 tubes as radio-frequency amplifiers, C-301-A or UV-201-A tubes be used for the audio-frequency amplification.

THE MOST SUITABLE ANTENNAS

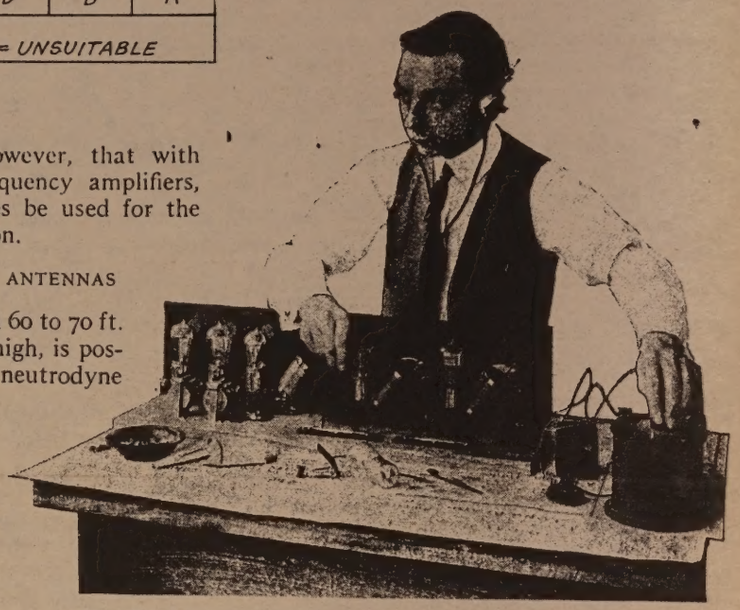
AN OUTDOOR antenna 60 to 70 ft. long and 30 to 40 ft. high, is possibly the best for use with a neutrodyne receiver. The multiple-wire antenna is generally no better than the single wire type for receiving.

A great many people desire to use an indoor antenna, either through necessity or to eliminate the trouble and expense of an outdoor installation. With a five-tube neutrodyne receiver, constructed in accordance with these articles, such an arrangement is feasible and in fact very good results can be obtained if one does not insist on getting the distant stations. A stretch of wire 50 or 60 ft. long in an apartment will work nicely, but this same length of wire should not be coiled around the wall in a single room and the same results expected.

There is still loop reception to be considered. Many people are using neutrodyne receivers with loop antennas. There are several methods of connecting a loop to the receiver: connecting one terminal of the loop to the antenna binding post; connecting both terminals to the antenna binding post, thus shortening the loop itself; connecting the loop in series with a variable condenser and then connecting the condenser and loop in series with the antenna and ground binding post; and connecting one terminal to the antenna post and the other to the ground post. This is the arrangement most frequently used. In any of these cases it will usually be best to have the ground binding post to the receiver connected to the ground wire. The five-tube receiver described is not designed primarily for loop reception and an outdoor antenna is strongly advised.

"TROUBLE SHOOTING"

THERE are people, who build receivers, that have very little technical knowledge, and it is somewhat difficult to describe to them technical processes. Even the simplest thing which the radio amateur or experimenter takes for granted are at first puzzling to the uninitiated, and it is not surprising that many people who have constructed neutrodyne circuit receivers have not been able to obtain complete satisfaction at their first efforts.



MR. STARK ADJUSTING THE SECOND "NEUTRODON"

A detailed list of "trouble-shooting" instructions that will usually aid the home constructor to put the breath of life into his receiver satisfactorily follows:

Check all connections very carefully with the picture wiring diagram given in the second article of this series (RADIO BROADCAST, Jan. 1924). After your own check convinces you that your wiring is correct and absolutely identical with the diagram, it is best to have someone else check it over so that the same mistake will not be repeated.

A point of great importance is that the variable condenser of the Neutroformer unit rotary plate terminal be connected directly to the negative terminal of the vacuum-tube socket of the amplifier tubes. It will be noted in the diagram, however, that this wire from the rotary condenser plate terminal of the third from the right hand Neutroformer connects to the +90-volt terminal of the detector tube.

Audio Transformers: Many times, when

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howling occurs, reversing the connections to the primaries of either one or both of the audio-frequency transformers will remedy the trouble. The drawing Fig. 3 shows the correct arrangement of transformer terminals and also the best plan of connecting the various leads from the transformer windings to the terminals.

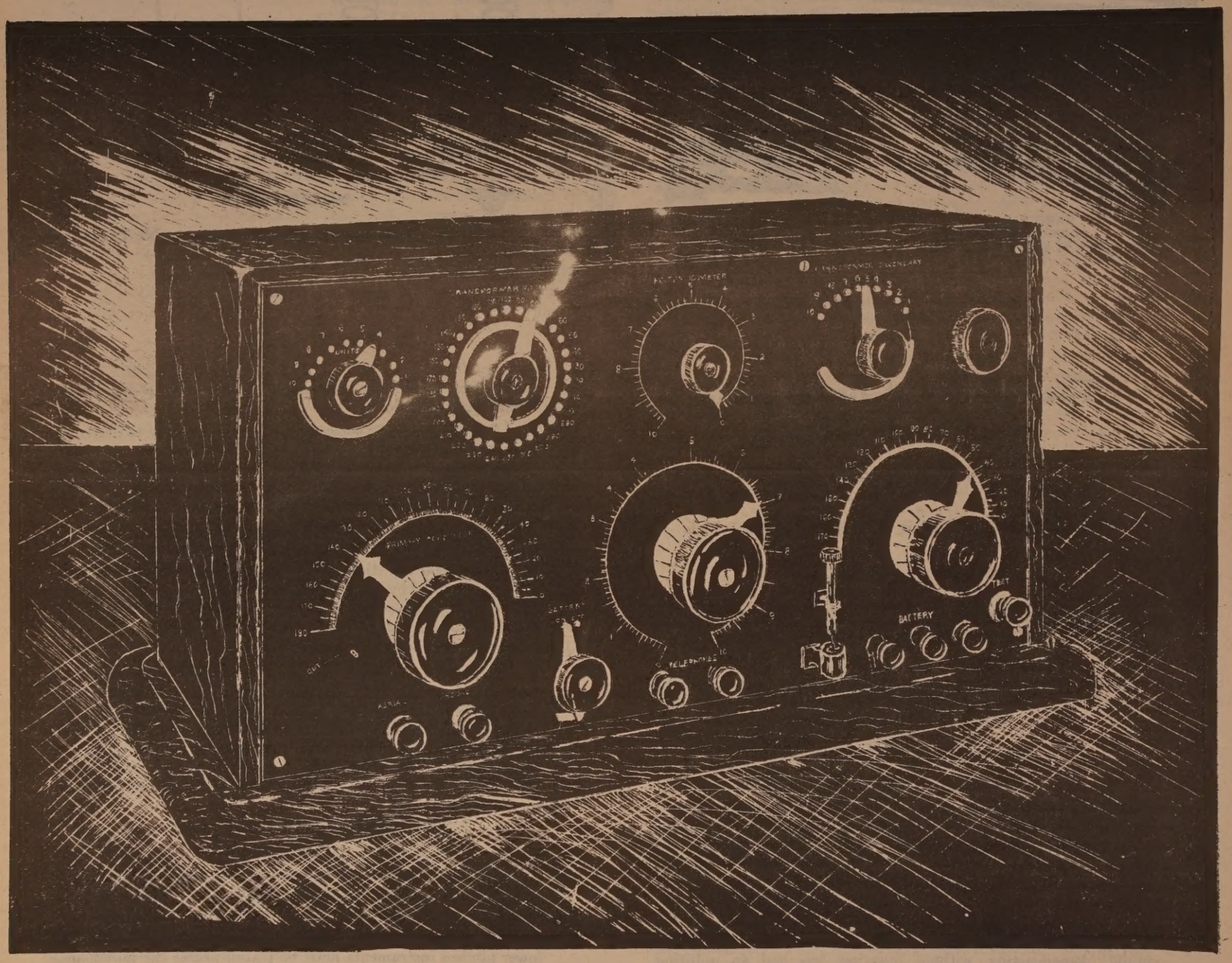
Fixed Condensers: In special cases, where trouble with balancing out is had, it may be advantageous to cut out entirely the fixed condenser (capacity .006 mfd.) which is connected from the detector tube plate terminal to ground of the negative A and B batteries common lead. Eliminating this condenser and re-balancing carefully will many times secure a very good minimum or inaudible signal balance.

Dirty Contacts: Connections which lead from the elements of the vacuum tube to the direct terminals are soldered to the tube contact pins and these soldering connections oxidize and become dirty very quickly. One should see that the bottoms of these tube contact pins are always bright and clean.

Neutroformer Mounting: The neutrodyne circuit requires that all electromagnetic coupling as well as electrostatic coupling be balanced or neutralized. Accordingly, the mounting of the Neutroformer is of great importance, and the correct angle that they should be mounted at is 54.7 degrees from the horizontal. A slight variation from this angle will cause trouble in balancing out. If the experimenter drills his own panels, great care should be taken to see that this angle is correct.

Be sure that all your connections are OK. Then if your set is built in accordance with the directions given in these articles, the results will repay you many times over for your work.

from a scrapbook

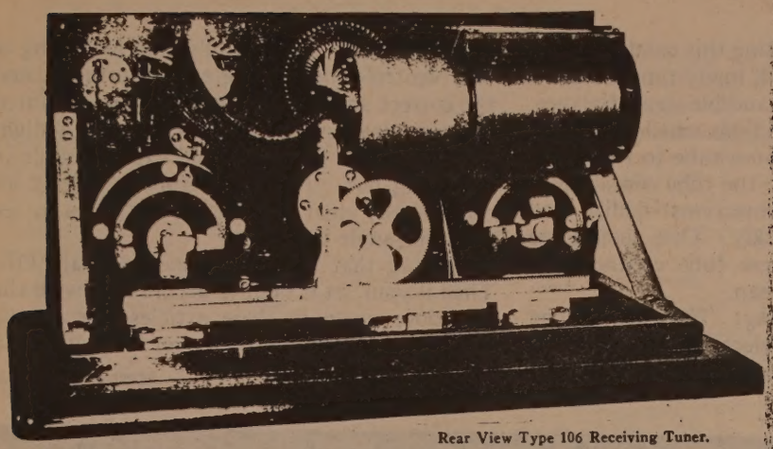


MARCONI 106 ...

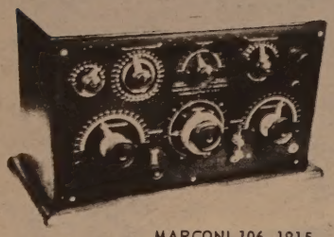
The 1915 Marconi 106 is a receiving set of particular excellence combining mechanical and electrical features of merit as described by early wireless pioneer, Elmer Bucher.

Quality construction is expressed from the set by the way coupling is varied by means of special rack and pinion adjustment which is in turn controlled by a knob on the front of the panel. This can be studied in the rear view illustration on the next page.

However, when R.C.A. took over, drastic changes were made on the mechanical structure of the 106. Look at the inside view of the 106D, which was modified by General Electric for R.C.A. in 1922. On the front panel, only minor changes like binding posts were removed.

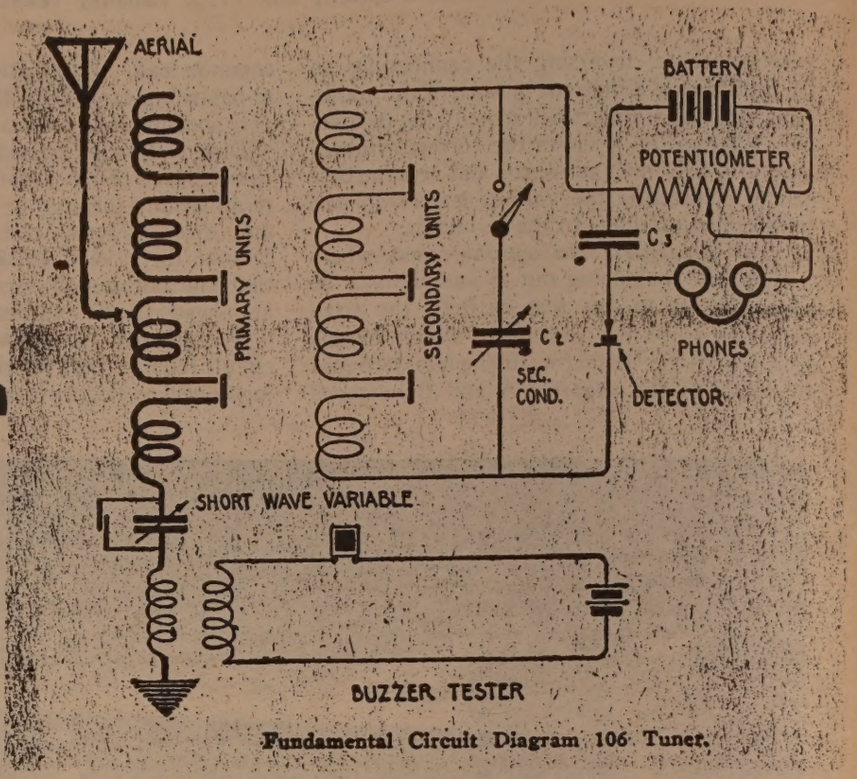


Rear View Type 106 Receiving Tuner.



MARCONI 106 1915
MODIFIED TO 106D BY
GEN. ELEC. FOR RCA. 1922

INSIDE VIEW
MARCONI 106D



Fundamental Circuit Diagram 106 Tuner.

The History of Broadcasting in the United States

By **H. P. DAVIS, Vice-President**

Westinghouse Electric & Manufacturing Co.

An address delivered before the Graduate School of Business Administration, Harvard University, April 21, 1928.

(Continued from last month.)

Feel Public's Pulse by Letters

We continually felt the pulse of the public through the thousands of letters sent to us, to determine their wishes in program arrangement. Some of these early letters were very interesting and instructive, and because of them we were from the very first led to maintain a high standard, not only in musical offerings but also in the lectures, addresses and other forms of program. It is believed that because the most important broadcasting stations have maintained their quality of program the radio listeners in the mass appreciate the quality offering more than one of ordinary grade. Broadcasting, without question, has had an uplifting effect upon the taste of the public in music—a fact well appreciated by the musical fraternity.

Develop Modulation Meter

It was very soon discovered that the characteristics of the microphone were quite different from those of the human ear. The microphone responds to certain frequencies more readily than to others. Consequently, a grouping in a studio that would be satisfactory to the ear direct might not be at all pleasing when heard over the radio.

A little experience showed that it was necessary to determine accurate standards that can be applied in advance to assure that music as reproduced in the receiver, is properly balanced—that is, proper blending of high and low tones and also proper relation of volume of accompaniment and leading melodies.

Musical tones vary in pitch from the lowest tone on the piano, which produces 27 vibrations per second, to the highest tone of more than 4000 vibrations per second. These fundamental tones are superimposed by higher harmonics which determine the nature of the tone produced thus making it possible to distinguish between the violin, flute, clarinet, trumpet, etc., or the most complicated sound, which is the human voice.

To provide a means of control, a modulation meter calibrated from 1–100 was devised. This instrument is now standard equipment in every transmitter. It is used to study the effect of different kinds of music or frequencies upon the current in the modulating tubes—an important factor that determines the quality of broadcasting. Over-modulation causes distortion, and under-modulation gives too weak a signal, difficult to reproduce clearly on the receiving sets.

For a given volume of sound a high pitched tone produces a higher reading on the modulation meter than a lower tone—that is, the higher tones more easily produce distortion of music. This fact makes it evident that the arrangement of instruments in an orchestra, for example, when broadcasting, must be different from that of the usual set-up in an auditorium. It was found that the lower pitched instruments must be placed nearer the microphone than those of higher pitch. On the basis of data compiled on a large number of observations and careful checking of the music as actually produced in the studio, and the results obtained on a receiving set, a series of charts was worked out by Mr. A. G. Popcke one of the Westinghouse Electric & Manufacturing Company's engineers, showing the proper location of soloists and piano, also the proper grouping of instruments of various combinations as quartets, orchestra, band, etc.

Chart Studio Acoustics

Of course, these charts were related to the acoustics of the studio and also to the type of microphone used. For this reason, as the art progressed, it was necessary to make changes in the placing of artists before the microphone.

Greater distance from the microphone is now possible on account of the improvements that have been made in the microphones, and the amplifiers used. The old-time carbon microphone had a strong frying undertone, or "ground tone", the volume of which was a considerable percentage of the volume of music to be broadcast. Up-to-date apparatus has reduced this ground tone to a very small percentage of the sound to be broadcast, and consequently greater amplification is used which results in greater possible distance between performer and microphone.

This increase in distance has simplified the problem of the proper placing of orchestra, for example. The musicians are not crowded about the microphone. The increase in distance has decreased the percentage of error due to slight departures from the proper placing of performers. In fact, the music in an auditorium can be picked up successfully with the regular seating of the orchestra by locating one or more microphones at the proper points.

The results accomplished by this kind of work, together with the work done on microphones and improvements in design of transmitters, have brought about much improvement in transmitting programs of the higher quality with greater fidelity, and if the radio audience use receiving equipment, particularly amplifiers and loud speakers, which will successfully reproduce all the frequencies that are transmitted, nearly perfect reception is possible.

Short Wave Work

Meanwhile, KDKA was reaching out and pioneering in a branch of development of the radio art which now bids fair to be the most important in the science of communication. I refer to the work that the Westinghouse Company's engineers have done in short wave transmission, and from which much is expected by radio engineers.

Early in 1922 we were convinced that there were wonderful possibilities which were being overlooked in the then unused and rather despised short wave bands, considerably lower than those then in use for broadcasting and for communication. An experimental station known as KDPM was installed at the Westinghouse Company's plant at Cleveland, Ohio, and serious work was undertaken between KDKA at East Pittsburgh and this station in an investigation of the subject of short wave transmission and re-broadcasting. Since that time, research and development work in this branch of the art have been carried on continuously and vigorously.

In the fall of 1923 the Westinghouse Company located a re-broadcasting station at Hastings, Nebraska, it becoming the well-known KFKX. At this point short wave transmissions from KDKA were nightly received and re-broadcast on the station's assigned wavelength.

Great Britain Relays KDKA

On New Year's Eve, 1923, through previous arrangement, KDKA transmitted a short wave program to Great Britain. This program was re-broadcast to British listeners through a station operated by the Metropolitan Vickers Company at Manchester, England, and was the first internationally broadcast program, as well as the first to be rebroadcast.

This work in short wave transmission led us to continue striving for distance. On December 12, 1924, KDKA's short wave program was received and re-transmitted in Johannesburg, South Africa, by a newspaper there—The Johannesburg Star—and a few weeks later, January 25, 1925, we transmitted a program to Australia. This transmission marked the ultimate in distance transmission since it was half-way around the world. Two days later, our short wave programs were received and re-broadcast in Melbourne, Australia, completing the record of our achievement. In every event so listed, the event marked the first time in history that such an achievement had been accomplished. The records show that KDKA's short wave transmission have been heard in every part of the world.

Far North Broadcasts

One important phase of the Westinghouse Company's broadcasting activities has been its so-called Far North Broadcasts, initiated through the foresight of Mr. George A. Wendt of the Canadian Westinghouse Company, Limited.

These programs now consist of a most fascinating list of letters, news reports and information from employes, relatives and friends of that band of adventurous folk whose lives are spent in small habitations, for the most part, above the Arctic Circle. The activities that resulted in the Far North Broadcasts began in the summer of 1923 when a number of receivers was distributed by the Canadian Westinghouse Company, to the Far North posts of the Royal Canadian Mounted Police. Because of these receiving sets we were enabled to transmit messages to them, at first by KDKA, then later by the other Westinghouse stations. As season after season of transmitting has been conducted, more and more of the companies operating posts in the North of Canada, have supplied receiving sets to their representatives with the result that nearly all such places now have radio receiving installations.

Among the companies which have so equipped their posts are the Royal Canadian Mounted Police, the Hudson's Bay Company, the Revillon Freres, the Oblate Fathers, and others. To this host of listeners, the Westinghouse stations each winter send a series of messages, most of which are of unique importance to those living out of reach of all civilization save that which comes to them from the ether. We have sent messages that have saved lives, rearranged winter plans, have caused heartache, and happy reunion - all over that great area starting from Greenland in the east, thence over the coast of Labrador and all the way across Northern Canada. These Far North Boradcasts are among the most important things that broadcasting has ever accomplished.

The radio messages sent into the Far North were often the only communication those people had with the world for six months; it required often many months for the acknowledgments to reach us.

Frequency Modulation

Another pioneering step occurred—this time at East Pittsburgh where KDKA had been operating for some time with a different type of modulation called "frequency modulation", by means of which we are able to eliminate three-quarters of the number of transmitting tubes that are required in the ordinary manner of transmitting. Further, the wave band is greatly sharpened and eliminates side band interference. Much is expected from this innovation later.

Radio Industry of Huge Size

The business of the radio industry in 1920 did not amount to more than $2,000,000 for the year. In 1927, this had grown to an annual business approximating $500,000,000—all due to broadcasting.

Broadcasting, therefore, means everything to the industry since there would be nothing without it. Broadcasting itself would be nothing without the listeners, of which it is now estimated there are 40,000,000. The problem of the broadcasters, therefore, is to constantly strive to hold and increase the interest of the listening public. Nothing could be more useless than a broadcasting station without listeners, or a receiving set without a broadcasting station.

In the year prior to the appointment of the Federal Radio Commission, the entire industry was threatened with destruction due to the chaotic condition existing in broadcasting. Happily the Commission was appointed in time, and through its efforts very great improvements have been instituted.

Broadcasting, however, is still an infant. Much remains to

be done in the way of research and development. This is quite evident from the facts herein recited of the step by step pioneering and epochal steps taken at KDKA.

Work of this nature requires the highest kind of engineering and research skill. It requires expensive and extensive facilities and the expenditures of large sums of money. There are, therefore, only a few organizations in the world that are in a position to undertake work of this kind.

Start of National Broadcasting Company

Mr. Owen D. Young, Chairman of the Board of Directors of the Radio Corporation of America, through whose foresight and wonderful organizing ability is due much of the present development in the radio field, realizing this condition, proposed a plan of cooperation between the Radio Corporation of America, General Electric Company and the Westinghouse Electric & Manufacturing Company whereby this important field of broadcasting could be organized and developed. This resulted in the formation of the National Broadcasting Company—an organization to devote its whole effort to the building up and developing of the broadcasting service through improved methods and programs, and to furnish a service throughout the country to properly located and selected stations in a manner similar to the service furnished to newspapers by the various Press associations.

Nothing could be more fortunate for radio's future than this. The participation of these important electrical organizations in the work of the National Broadcasting Company guarantees to it adequate financial strength and permits an organization and equipment to be provided that will be capable of coordinating and presenting program material of the highest order, backed by the vast technical resources of these large companies.

Certainly this guarantees to the listening public that broadcasting is now on a firm and lasting basis, and that it will become increasingly better as time goes on.

A National Service

As the name implies, the National Broadcasting Company is a national service. It is not limited to east or west, north or south. It covers the entire nation through several networks and groups and individual stations. Its programs, therefore, have the widest possible appeal to all classes, localities and interests. This organization has, in fact, been charged with the stewardship of national entertainment and enlightenment—the greatest task ever assigned to any commercial enterprise.

Mr. Young further indicated the high purpose he had in mind in the organization of the National Broadcasting Company and guaranteed its good faith to the public by inviting eighteen recognized leaders in public life in this country to serve as an advisory council. This was done so that the National Broadcasting Company might have the guidance of men and women prominent in al phases of public life, and it is believed that from their advice will come the highest utilitarian development of this wonderful service.

Improvement and expansion in program offerings and in program technique, under the able leadership of Mr. Merlin Hall Aylesworth, and his staff, have been very marked since the formation of the National Broadcasting Company.

No history of broadcasting can be complete without reference to Mr. David Sarnoff, Vice President and General Manager of the Radio Corporation of America, an early pioneer, whose fine judgment, clear vision and high executive ability have made him the guiding genius of the entire radio industry. Many times in our early days have we gone to him with our problems, and have never failed to be encouraged by his unbounded confidence and enthusiasm, and sound advice.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
x SCHEMATICS 1920-1960 x
x RADIO/TV/HAM/MISC. x
x x
x YOUR SATISFACTION OR x
x YOUR $3.50 REFUNDED. x
x x
x ALTON H. BOWMAN x
x 4172 EAST AVE.,RD 2 x
x CANANDAIGUA, NY 14424 x
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Who Is to Pay?

From the very beginning the question of "who is to pay" has been constantly raised, and one plan after another has been proposed, and abandoned.

I can say that we have never felt concerned about this point, firm in our belief from the beginning that this service was so necessary in our daily lives that ways would develop to make it self-supporting.

Its advertising value has always been recognized, and it was evident from the beginning that sooner or later that this would be realized and would be the answer to the question.

It is a distinctive and encompassing medium. It is the greatest and most intimate contact that has ever appeared, and is wholly personal in its appeal. It has now become the key to millions of homes, and the individual or firm that can bring the subject of its activities in an adroit and satisfying way to the listening millions is employing a means for great commerical possibilities in the disposal of its product, and can justify the expenditure of large sums of money in its development.

Other Forms of Amusement Safe

It is apparent, therefore, that insofar as this advertising appeal can be effectively developed, we need not worry about the source from which the money to pay will come. In the industrial development of this age, as one innovation succeeds another, there always arises the specter of obsolescence, but its baneful influence extends only to those industries or organizations that have become sterile and impotent. If they have the energy and ability to accept the new and to reconstruct the old, the combination means new life and development in general.

No danger is threatened to other sources of amusement and entertainment in the development of radio except to those that are decadent enough to deserve death, but radio certainly will be a stimulant for what is novel and new and better, and will educate people in that direction and stimulate their interest and desire for the better things of life. Insofar as amusement and entertainment cater to those desires and instincts, they have nothing to fear and everything to gain from radio.

What of the Future?

But what of the future? Great innovations come infrequently, but often unexpectedly. No one ten years ago would have envisaged the actualities of today, yet we, who are closest to it, may presume to predict that in spite of the great developments to date the ground has scarcely been scratched, and that even more wonderful advances and possibilities are near at hand. Radio vision, whereby we shall see as well as hear by radio, is an accomplished fact; talking movies in the home, nearly here. No more visionary than some of the actualities of today were a dozen years ago, is the possibility of the transmission of power by radio.

We who are now active may have to leave much of these future developments to others; still we can feel content, ourselves, to have been a pioneer whose dreams and struggles have borne the cherished fruits of successful accomplishment—usually a sufficient reward, but in this instance many times amplified when we contemplate the greatness of the service and industry that has developed from the modest beginning I have recited to you today.

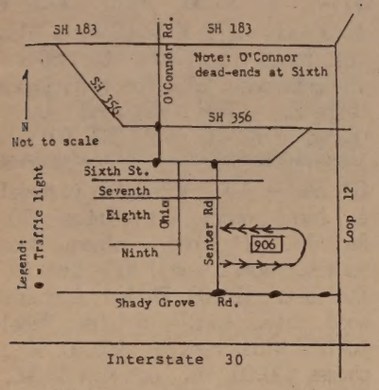
You have all heard of the famous statue of Memnon—out upon the shifting sands it sits, a calm on its face, its voice forever hushed. But of old it spoke, and once each day, as each new sun arose, there came forth from its lips a sound. And worshippers came long pilgrimages and knelt in the sand to catch that sound, which was in their ears as a voice from Heaven.

So the voice of Radio comes to its devotees almost as a voice from another world. In fact, radio broadcasting has brought to humanity a new and heavenly vision, if not a new world.

SPRING AUCTION

Vintage Radio and Phonograph Society is geeting ready for a Vintage Radio Spring Auction on June 18, 1988. It will be held at the Irving Garden Center, 906 Senter Road, Irving, Texas. The Center will be open at 10:00 a.m. to receive the fine old radio sets for the auction which is scheduled to start at 1:00 p.m.

Interested? Call Ken Deibel at (214) 352-9914.



CROSLEY 170

SOME of the 10-tube Crosley model 170 receivers have an intermittent trouble, the source of which in some cases is hard to locate unless the fault has been encountered before.

The set will suddenly stop and get very noisy and full of squeals. Snapping a light switch or set switch starts it operating again. This trouble was found to be the 8 mf. condenser across the 25,000 ohm bleed resistance. This condenser is one of a 3 section unit, and all 3 should be replaced (for a permanent job).

THE tone and volume of this 10-tube model can be improved by connecting a bypass condenser of 2 to 4 mf. across the first A.F. bias resistor. Experience has shown that this also helps cut the background noise in this, and the 7-tube models. The condenser mentioned above helps, but reducing the resistance of the diode load resistor helps more. This raises the sensitivity also. It has been our experience that the fading and blasting is not increased by doing this. Change the load resistor from .5-meg. to .35 or .4-meg., depending on conditions.

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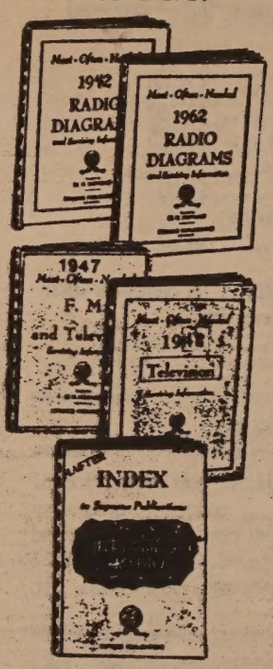

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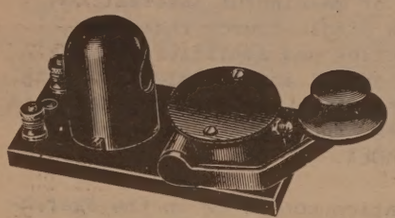

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FOR SALE — PHILCO

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PHILCO 95TH ANNIVERSARY limited edition cathedral radio, AM/FM transistor chassis, look a like to Philco model 90 - 1932- collector's item, only $89.91 plus $5.00 shipping. Maurer TV, 29 South 4th Street, Lebanon, PA 17042.

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FOR SALE — TUBES, PARTS, ETC.

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FOR SALE: NEW IN ORIGINAL BOX, 215-A WESTINGHOUSE $30.00. ONE BRASSBASE UV-201-A TUBE EX. CONDITION POST PAID. $20.00 NO TIP USED. CLEON BOOTHE, BOX 235, COHOCTON, NY 14826.

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FOR SALE: PLUG-IN REPLACEMENT 864/WD11 tubes, adapters; any triode to WD-11 socket. Send SASE for literature. WANTED: 864 tubes, buy or trade for above. James Fred, R 1, Cutler, IN 46920.

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LARGE STOCK OF TUBES FOR TV AND RADIOS 1940'S UP. NEW IN ORIGINAL BOXES. ALSO HAVE SOME TRANSMITTER TUBES. SASE FOR LIST. R. OLMSTED, 605 W. THOMPSON LANE, MURFREESBORO TN 37130. (615) 893-5344.

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FOR SALE; UNUSED AND USED TUBES, cone speakers, electrolytic capacitors, phono cartridges and needles, send SASE for lists. C. Elmer Nelson, 11 S. Church Street, Princeton, Il 61356.

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TELEVISIONS

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RCA TV Model 8PT7010 in red metal case in working condition. Included second set same model for parts. Make offer. John Schellkopf, 1344 Goucher Street, Pacific Palisades, CA 90272.

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FOR SALE — ZENITH

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THE CABINET IS IN MINT CONDITION and the radio plays. It is a Zenith 12 tube superhetrodyne with a tuning range 540-18400 kyc., chassis 1204-A. Marshall T. Bond, 8718 Linkfair lane, Houston, TX 77025. (713) 668-0029.

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FOR SALE: 1940'S VINTAGE ZENITH CONSOLE radio and phonograph. Cabinet is in excellent condition. $250.00 — Call (815) 838-5398. 5 p.m. to 10 p.m. c.s.t. Dick Stauss, Rt. 1 Box 399, Lockport, IL 60441.

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WANTED — EDISON

WANTED FOR EDISON STANDARD phono— model B. 1.) mainspring 2.) decals-trademark and "Edison, 3.) cabinet lid 4.) A. K. breadboard in excellent condition. Carl Hickey, 27404 N. Highway 1, Fort Bragg, CA 95437. (707) 964-0505.

WANTED — GENERAL

WANTED: A WIRE RECORDER for playing 3 3/4" spools of recording wire. Used navy equipment. Russell Starkey, 855 Eisenhower Avenue, Jasper, IN 47546. Phone (812) 482-1016.

SIDE TUNING KNOB FOR BELMONT 6D111, manual and schematic for measurements model 80 and Heathkit LG-1 signal generators, RIDERS vols. 16-23, and SAMS 1-700. Looking for a book by the title of "Case Histories of Receiver Troubles and their Remedies," published by Rinehart Books in addition to a hard-cover copy of Tyne's "The Saga of the Vacuum Tube." Am also interested in contacting other collectors in Columbus, Ohio area. Brett Gundlach, 276 E. COMO AVE., COLUMBUS, OHIO 43202, HOME 614) 267-0346, WORK (614) 888-9502.

RADIOLA 28 with 104 speaker, Radiola 25, Radiola 20, Norden Hauck Superhet, Leutz Superhet, Pilot Super Wasp, Pilot parts, Crosley parts, Atwater Kent parts and AK breadboard parts, RCA UZ-1320 horn, Radiola RS, Zenith Super VII or VIII, crystal sets, Burns horn, Emmett A. Smith, 2714 Alden Road, Baltimore, MD 21234.

WANTED— CABINETS FOR RADIOLA X, AND FEDERAL 59. DISPLAY SODION

TUBE, UNUSUAL HAND KEYS, INFORMATION ON HALLECK-WATSON COMPANY OF PORTLAND, OREGON. PAT STEWART, W7GVC, 1404 RUTH AVE., WALLA WALLA, WA 99362.

WANTED: ZENITH 11 OR 12 BAND "TRANS-OCEANIC" TRANSISTOR, TOSHIBA "GLOBE-TROTTER," SONY "ORBITER" RECEIVERS OR PARTS, ALSO KLH-21 FM ONLY RADIO. BILL WADE, 657 14TH AVENUE, PROSPECT PARK, PA 19076.

WANTED: ENTIRE WORKS for Capehart 500K, also Edison C-1, C-2, Balmoral and Alva, Victor 10-51A, Tom Grattelo, 2818 Central, Alameda, CA 94501.

PEERLESS MODEL 19AR-60 9" DYNAMIC speaker with cabinet in good working condition. H-P model 410C VTVM working. RCA Victor R-35 radio in excellent working condition. Simpson model 1699 milliohmmeter in working condition. Radiola 20 chassis with good audios. Audio transformer for RCA Victor R15 or RCA Radiola 48. Radio Broadcast magazines for 1922 and 1928. Early Canadian Radio magazines such as Canadian Wireless, Radio, etc. Radio News for July, August and October 1919. October 1921, January 1922, August and September 1924. Top prices for good condition magazines. R. A. McNeill, P. O. Box 472, Yorkton, Sask., Canada S3N 2W4 (306) 783-6121.

WANTED: DECANTER BOTTLES, ice bucket, shot and drinking glasses for model 9008-B Porto-Baradio made by Stewart Warner. Clarence MCGinnis, 1507 N. Glenn Street, Morristown, TN 37814.

WANTED: OWNERS OF EARLY ELECTRICAL magazines, MODERN ELECTRICS, ELECTRICIAN & MECHANIC, etc. I will pay for good photocopies of articles on spark gaps, high frequency Tesla & Oudin coil projects, etc. Need information for forthcoming bibliography. Write first to TCBA, RD3 Box 181, Glens Falls, NY 12801.

WANTED: WWII MILITARY Iconoscope TV camera or tube alone. OK if converted to amateur use. Canadian Marconiphone III regen., IV neutragenaflex, VI, VIIA, VIII, IX, XI. Canadian Westinghouse model W55, W55A, W60A, W57. Hammarlund Trans-Oceanic "Two", De Luxe, Hawk. Kresge Z4 Commander, Karas Short Wave Receiver. D'Arcy Brownrigg, P.O. Box 292, Chelsea, Quebec, JOX 1NO, Canada.

WANTED: A. K. MODEL 55, need everything to mate with gear on tuning condenser. Could also use but not so critical speaker or cone for above. Floor cabinet model, need ivory knob, prefer function for FADA mdl. 790. Will buy junk A.K. if it has at least the tuning parts. C. England, 98 Montague, So. Zanesville, OH 43701.

WANTED: COVER FOR A.K. 55 tin box. Also, 4 tube covers for Advance Neutrowound. Will buy junk set. Jerome Schliepp, 831 Old Berlin Road, Rippon, WI 54971.

C-4 TUBE. for Columbia radio model C-80A. SPRING AND PLATE for A.K. speaker model M. Russ Schoen, E 7340 Nietkze Road, Clintonville, WI 54929. (715) 823-6744.

I BUY BATTERY RADIOS and horns from the 20's, if you have one to sell, send me a card with name, model and price. Rick Parrish, 1260 marilyn Drive, Cape Gir., MO 63701.

WANTED: ZENITH OCEANIC 7000, TOSHIBA- GLOBAL, GRUNDIG SATELLITE OR SONY "ORBITER" BATTERY MULTIBAND SET, WADE, 657 14TH AVENUE, PROSPECT PARK, PA 19076.

WANTED: ONE VERY NICE RADIOLA 100 A LOUD SPEAKER, PLEASE WRITE: PAUL O'PATIK, 316 RUTHERFORD AVENUE, FRANKLIN, NJ 07416.

DO YOU HAVE THAT CLASSICAL 78 ALBUM that has a damaged or missing record? I have an "album singles for sale" listing that I will send to anyone for a 25 cent long self-addressed stamped envelope. Anton Johannes, R.D. #3 Box 253, Pine Bush, NY 12566.

WANTED. I BUY RADIO TV collections. Please send description and price desired. John Kendall, P. O. Box 436, Fallston, MD 21047.

WANTED— SCHEMATIC, ETC. ON BLUE RIBBON AND REMINGTON 5 TUBE RADIOS, OR OTHER RADIOS LIKE THE ABOVE. WANT TO GET THEM WORKING WITH ORIGINAL PARTS. W. G. WEAMER, 390 E. FOSTER ROAD, SANTA MARIA, CA 93455.

WANTED "TENSOR ANALYSIS OF NETWORKS" by Kron; Briggs and Stratton crystal set; accessories for "smokerette" radio. Forrest Baker, 1558 W. Garfield, Davenport, IA 52804.

WANTED — HEADPHONES

WANTED: NONWORKING OR WORKING headphones: Mesco, Kennedy, Eisemann, Sampson, Kilbourne Clark, Kellog, Brownies, earliest Brandes with steel headband. Vernon Kostohryz, 600 Lakeside 3A, Brownsville, TX (512) 541-5692.

WANTED — LITERATURE

WANTED: SCHEMATIC TEL-SWEEP GENERATOR. MODEL TSW-50-1948 VISION LABS, JOHN G. MC DADE, 204 E. JOPPA ROAD, #214, TOWSON. MD 21204.

EVERY DAY MECHANICS, VOL. I, NO. 4, MAY 1916 OR A COPY OF "HOW TO BUILD A TRANS- ATLANTIC WIRELESS RECEIVING SET. K. A. LADD, 5240 44TH AVE. S., MPLS., MN 55417. (612) 722-6786.

LAFAYETTE RADIO CATALOGS - 1960 THRU 1968, PLEASE STATE CONDITION AND PRICE. MR. MICHAEL S. SABODISH, SR., 11 - A MATAWAN AVENUE, CLIFFWOOD, NEW JERSEY 07721.

WANTED: OPERATING MANUAL and tube data sheets for Jackson Dynamic tube tester model 636. Zerox copy O.K. Frank Hoffert, 19605 Chardon Road, Cleveland, OH 44117.

WANTED - INFORMATION AND SCHEMATIC for Blaupunkt Sultan 3D radio. Model number unknown, 5 tube AM/FM/ SW. Write Ray Carifio, N4LTS, 6014 SW 33rd Street, Miami, FL 33155

WANTED: LIBRARY BOUND volumes of QST, CQ, 73 PRE 1960. ALSO GLOBE SCOUT (WRL), MIKE GRIMES, K5MLG, 3805 APPOMATTOX CIRCLE, PLANO, TX 75023.

WANTED: SCHEMATIC FOR SILVERTONE MODEL 7166. TOM JOHNSON, 215 E. 7TH STREET, AMES, IA 50010.

WANTED: SCHEMATIC AND INFO on Eico ST 70 amplifier. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada T6H 0H9.

WANTED: INSTRUCTIONS FOR PACO MODEL 25 IN-CIRCUIT CAPACITOR TESTER RCA WR-50A SIGNAL GENERATOR CRYSTALINER (CRYSTAL MODULES) GENERATOR, GLENN HARTMAN, 5545 DEEP HOLLOW, FAYETTEVILLE, NC 28311.

WANTED — PARTS, TUBES, ETC.

EARLY OR UNUSUAL TUBES, tube cans, cartons also early light bulbs pre 1900. Please describe with prices wanted to: Bruce Harbeck, 13408 Westwood Lane, Omaha, NE 68144. (402) 333-9013.

HALLDORSON 3 to 1 audio transformer, copper casing. hard rubber panel 10 x 11 x 1/4. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada, T6H 0H9.

DETECTOR and AUDIO PORTION of GREBE CR2. Also need cabinet for same. NEED FRONT PANEL FOR SCOTT Phantom DELUXE. Larry Steeno, 2728 42nd Street, Two Rivers, WI 54221. (414) 794-7320.

MARCONIPHONE VIII cabinet, also Marconiphone VI chassis, or complete radios cash, or generous trade. Gordon Wilson, 11108 - 50 Avenue, Edmonton, Alberta, Canada, T6H 0H9.

WANTED: EMPTY CABINET for a Philco model 20 cathedral radio. I already have the radio and speaker. Must be in good condition. Joe Beach, 6515 Sunset, Garden City, MI 48135.

WANTED— CABINET AND PARTS FOR A FEDERAL 61. Mike Kibler, 300 Speiter #39, Danville, IL 61832. (217) 267-3703.

WANTED: ONE TUNING DIAL and one coil tap knob for a Crosley model XJ. Jack Emery, Box #84, 5546 Union Street, Lexington, MI 48450.

WANTED — PHILCO

PHILCO MODEL 20B 1930 "Baby Grand" radios. Original finish, and no chassis changes a must. Must be conpletely original and in working condition. Will pay top price for a real nice one. All replies will be answered. Write: Ronald G. Burtzos, 915 Crane Drive, Apt. 703, DeKalb, IL 60115.

PHILCO MODEL 90B, working or not. Original speaker from Philco model 20— must be in good shape. Thomas Abell, 1022 S. Edison Ave., South Bend, IN 46619. Phone (219) 234-8405.

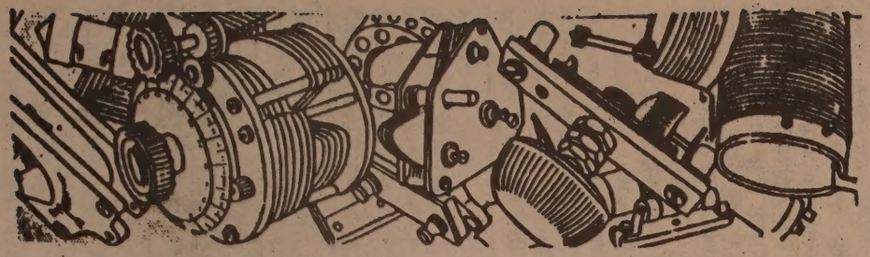
CHASSIS ONLY FOR PHILCO cathedral, model 37-61, Charles A. D'Alessio, 136 Changebridge Road, K4, Montville, NJ 07045. ((201) 263-4747.

WANTED — PLASTICS

WANTED: CATALIN RADIOS. All makes: FADA, OSWALD, EMERSON, MOTOROLA, etc. Top prices paid. R. Wayne Oliver, 355 Highwood Avenue, Leonia, NJ 07605. (201) 944-0777.

WANTED — ZENITH

ZENITH TRANSISTOR Trans-Oceanic 11 or 12 band radio- parts or com-plete. Have Rider TV manuals 2 thru 23 for offer. Wade, 657 14th Ave., Prospect Park, PA 19076.



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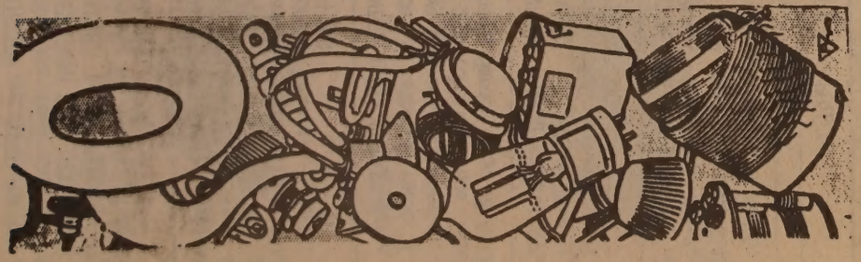

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